VIA UPS

Mr. David Keith
Project Coordinator
Anchor QEA, LLC
614 Magnolia Avenue
Ocean Springs, MS 39654

RE: Draft Baseline Ecological Risk Assessment
San Jacinto River Waste Pits Superfund Site, Harris County, Texas
Unilateral Administrative Order, CERCLA Docket No. 06-03-10

Dear Mr. Keith:

The Environmental Protection Agency (EPA) and other agencies have performed reviews of the above referenced document dated March 2012. The enclosed comments shall be incorporated in the Final Baseline Ecological Risk Assessment and copies provided for review and approval in accordance with the approved schedule.

If you have any questions, please contact me at (214) 665-8318, or send an e-mail message to miller.garyg@epa.gov.

Sincerely yours,

Gary Miller
Remedial Project Manager

Enclosure

cc: Luda Voskov (TCEQ)
Bob Allen (Harris County)
Linda Henry (Port of Houston)
Jessica White (NOAA)

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Comments
Draft Baseline Ecological Risk Assessment, dated March 2012

General Comments:

1. Evaluation of Threatened and Endangered Species: The EPA previously commented (see June 3, 2010 letter regarding review of the draft RI/FS Work Plan and SLERA, Comment 41) that if state or federally listed threatened or endangered wildlife species could occur in the vicinity of the Site, the SERA should designate a surrogate species for the protected species, and base any hazard quotient calculations or risk characterization on the NOAEL TRV (no-observed adverse effect level toxicity reference value) or equivalent. The PRPs agreed with the response and indicated that the text of Appendix B and Attachment Bl would be modified to address the appropriate surrogate species for any listed species that may occur at the Site. Appendix B of the RI/FS work plan generally stated (Section 2.3.2) that the risk assessment for the protected species would not employ the use of surrogates because of the potential to overestimate risk to these listed species, that realistic exposure parameters would be identified for these species, and species specific exposures would be evaluated against the appropriate TRVs in the BERA. The BERA did imply or state (Section 3.4.4) that the sandpiper would make an appropriate representative for the white-faced ibis, a State-threatened species, due to similar feeding/foraging strategies. Because the NOAEL hazard quotients for copper [central tendency (CT) = 2; reasonable maximum exposure concentration (RM) = 3] and TEQ_{DFP} (CT = 10; RM = 30) were greater than 1, the assessment shall include a more robust discussion/ analysis (TEQ_{DFP} denotes the toxicity equivalent (TEQ) concentrations calculated using dioxins and furans and dioxin-like PCBs). The text simply states that the ibis would only be an occasional visitor to the Site and its exposure potential is considered low.

2. Post TCRA (Time-Critical Removal Action) –Scenarios: Hazard quotient calculations were presented for the baseline site (before placement of the TCRA), and after TCRA placement. For the post-TCRA analysis, the evaluation assumed that $COPC_E$ (chemical of potential ecological concern) concentrations in sediments within the TCRA footprint (i.e., sediment or soil samples collected from within the original 1966 perimeter of the impoundments north of 1-10) are equal to the median concentration of the chemical in the upstream background sediment dataset or the background soil dataset. Additionally, pre-TCRA tissue concentrations were used in post-TCRA analyses. The following shall be considered: the presumption that the Site post-TCRA will continue to remain devoid of habitat assumes that the Site will be maintained to prevent this from happening. The assessment shall consider that the Site post-TCRA will develop habitat over time.

3. Estimating surface water concentrations of COPCs from sediments shall be considered a major data gap and point of uncertainty, and clarified as such in the report.

4. Figures depicting tissue sample locations shall include points at which the actual samples used in the analyses were located. The reader is unable to determine the spatial relationship between individual samples as currently depicted.

5. The presentation of the results of the BERA made it difficult to independently evaluate the risk conclusions. In particular, it would have been useful for the results to be presented in tables that included the site specific data along with the TRV or baseline values used for the assessment. By presenting the data in different locations, and by presenting primarily summaries rather than the raw data and calculations used to generate the summary data, it was challenging to trace the conclusions made in the BERA. A revision to this document shall include summary tables sufficient to allow reviewers to follow the assumptions made in the BERA.

6. It is not clear what criteria were used in the selection of toxicity references used to develop the TRVs for benthic invertebrates. References should have been prioritized by endpoint, life stage of receptor, habitat of receptor, and duration of test. Some of the references may not be appropriate for derivation of the TRV for this site (particularly those based on freshwater, acute tests). The report shall provide the selection criteria for the reference studies used.

7. The assumption that the exposure of receptors post-TCRA will be at background levels for soil and sediment for areas outside the containment area is questionable. The report shall provide justification for why the sediment outside the footprint of the cap may already be at the upstream concentrations.

8. Statements that surface water quality criteria (a typical ARAR), derived to be protective of human and ecological receptors “should not override site-specific values”. It shall be clarified whether or not this statement implies that site-specific values are equal to or more conservative than any ARARs. If not, these statements shall be deleted considering the requirements for ARARs and that the site is located in a dynamic and complex environment, where adequate site-specific exposure and risk assessment is difficult, at best.

9. The report shall include the rationale for the assumptions and conclusions included in the BERA so that they are transparent and understandable, and conservatism is demonstrated.

10. The report shall provide/expand its description and evaluation of food chain implications in the BERA.

Specific Comments

11. List of Acronyms: A definition for reasonable maximum exposure (RME) shall be added to the acronym list.

12. Section 2.1 Site Setting and General Conceptual Site Models: The report states that other sources of dioxins and furans are present on the site. The report shall describe these sources.

13. Section 3.4 Ecosystems Potentially at Risk: Protections under the Bald and Golden Eagle Protection Act are similar in nature to that of the Endangered Species Act. As such, any

surrogate (for Bald Eagle) risk characterization shall be done by comparing exposure to the NOAEL, rather than the LOAEL as presented here in the text.

14. Section 3.3.4 Endangered and Threatened Species at the Site: The report notes that the alligator snapping turtle is on the state list. The alligator snapping turtle's life history and occurrence shall be discussed as the other listed species are in the following paragraphs.

15. Section 3.8.4.1 Calculation of Hazard Quotients: Disagree with the assertion that exposures resulting in HQ_L<1 should be characterized as "negligible." Chronic exposure in the site setting to concentrations between the NOAEL and LOAEL could result in some risk. Acceptable and "negligible" risk characterizations shall be limited to those with HQ_N<1. Also, while not being quantified, risks of mixtures of COPCs shall be addressed in the uncertainty section of this document.

16. Section 3.8.4.5 Comparison of Site Risks to Background: The BERA refers to upstream background in a dynamic, tidal setting (Table 6-2, 6-7, 6-8); but no description of the samples that constitute background levels is provided. The report shall provide this description.

17. Section 4.1.1 Estimated Water Concentrations (Exposure of Benthic Macro-invertebrates): It appears that in Equation 4-2, the f_{oc} used is sample-specific. The report shall confirm this. Also, as this section deals with estimation of porewater concentrations, it shall be titled as such.

18. Section 4.1.3 Results of the Benthic Macro-invertebrate Exposure Evaluation: The BERA shall provide a table that summarizes the estimated sediment porewater concentrations (i.e., mean, maximum, and minimum number of samples) for the various $COPC_E$s evaluated in this manner for the benthic exposure pathway.

19. Section 4.2.1 $COPC_E$ Concentrations in Fish Diets: The referenced citation (Meador et al. 2010) shall reflect a 2011 date.

20. Section 4.2.2 Estimated Concentrations of Selected $COPC_E$s in Surface Water: Table 4-3 displays the sediment SWAC (surface area-weighted average concentration) and the estimated surface water concentration for a number of $COPC_E$s. The methodology for calculating the values is not necessarily transparent. By way of example, the report shall provide a table that displays the calculations for lead and nickel.

21. Section 4.3.1 Wildlife Exposure Model: Looking at the values for sediment (or soil) ingestion for the various wildlife receptors in Table 3-12, we assume that the Fs value is intended to be the fraction of the diet that is soil/ sediment and that the units column should be blank. The report shall clarify/confirm this.

22. Section 4.3.1.2 Relative Bioavailability Adjustment Factor: For the wildlife exposure model, the 2,3,7,8-TCDD concentration was multiplied by a relative bioavailability factor (RBA) based on a study by Nosek et al. (1992). In this study, adult ring-necked pheasant hens were administered a single dose of a suspension of TCDD radio- labeled earthworms, soil, paper

mill sludge, or crickets. Radioactivity remaining in the bird carcass after 24-hours was measured. This adjustment applied to $TEQ_{DF\ B}$ for sediment and soil at the shoreline, sediment outside of the western cell, shoreline background, post-TCRA shoreline, and soils north of IH-10. For tissue, this adjustment applied to $TEQ_{DF,B}$ for common rangia (site-wide and background) and blue crab (site-wide and background). Additionally, this adjustment applied to $TEQ_{DF,B}$ and $TEQ_{DF,M}$ for terrestrial invertebrates north of IH-10 and the peninsula only. It is unclear that the single exposure and uptake evaluation (after only 24 hr) utilized in the Nosek et al. study sufficiently represents reality (e.g., normal digestive tract residence time). We do not support the use of the referenced RBAs for the following reasons:

a. The bioavailability study is not site-specific;

b. Uncertainty regarding the dose duration and measurement time (was steady state achieved?);

c. Selective uptake of TCDD in bird tissues; and

d. Uncertainty in the TCDD dose concentration compared with prey/media concentrations at the San Jacinto River Site.

The referenced relative bioavailability factor shall not used, and shall be deleted from the report.

23. Section 4.3.1.3 Unit Conversions: Regarding the conversion of tissue concentrations expressed as wet weight to dry weight, the text shall indicate that this step was already performed (where appropriate) for each tissue sample based on the percent moisture/solids determined by the lab, and that the exposure point concentrations in Appendix C were determined after this conversion.

24. Section 4.3.1.5.1 Estimating $COPC_E$ Concentrations in Plants (Concentrations of $COPC_E$s in Foods of Alligator Snapping Turtle, Killdeer, Raccoon, and Marsh Rice Rat): The full reference for the Staples et al. (1997) citation was not provided. The report shall provide this reference to the reference section.

25. Section 4.3.1.5.2 Estimating $COPC_E$: Concentrations in Soil Invertebrates: Soil-to-invertebrate bioaccumulation factors (BAFs) for nickel and thallium were obtained from EPA (1999b) and are provided in Table 4-9. The BAFs are presented on a wet-weight basis in the EPA reference. Because the mammalian dose calculations are performed on a dry-weight basis, it is not clear if the estimated tissue concentrations were converted to dry weight. The report shall c1arify this and indicate the assumed moisture content.

26. Section 4.3.1.5.2 Estimating $COPC_E$ Concentrations in Soil Invertebrates: Burton et a1. (2006) was used to establish BAFs for estimating tissue concentrations (based on Site soil concentrations) for mercury. According to the BERA discussion and Table 4-9, an uptake factor of 3.1 was used for soil concentrations less than or equal to 1.5 mg/kg, and an uptake factor of 0.7 was used for soil concentrations greater than 1.5 mg/kg. Because these BAF

values were applied to individual surface soil sample locations, the report shall add information in Appendix C that indicates the predicted CT and RM exposure concentrations for mercury for soil invertebrates.

27. Section 4.3.1.5.2 Estimating $COPC_E$ Concentrations in Soil Invertebrates: Regarding PCBs, the discussion indicates congener-specific models were not used to estimate invertebrate concentrations because there are no PCB congener data for soils at the Site. This is confusing because Table 4-12 indicates $TEQ_{P,B}$ values for the killdeer, Table 6-5 indicates hazard quotients for $TEQ_{P,B}$ for the killdeer, Table 6-9 indicates hazard quotients for $TEQ_{P,M}$ for the marsh rice rat and raccoon, and Table C-l indicates $TEQ_{P,B}$ and $TEQ_{P,M}$ values for soils north of IH-10. The report shall clarify and indicate how TEQ_P was evaluated for terrestrial receptors.

28. Section 4.3.1.5.2 Estimating $COPC_E$ Concentrations in Soil Invertebrates: Paired soil and earthworm tissue dioxin and furan data (n = 6) from the St. Regis Paper Company Superfund Site in Cass Lake, Minnesota were used to develop a series of regression and correlation relationships for dioxin and furan congeners. These were used to estimate dioxin and furan concentrations in soil invertebrate tissue for use in the wildlife exposure model for the killdeer and raccoon. For this analysis, P-values ≤ 0.1 were considered statistically significant, and significant regression relationships between soil and tissue were developed for 11 of the 17 congeners. For the remaining 6 congeners, correlation relationships were determined with other congeners. The resulting estimated concentrations of dioxins and furans (TEQ_{DF}) in terrestrial invertebrate tissue for the raccoon or killdeer exposure scenario are shown in Table D-6. Although Sample et a1. (1996) is mentioned in the discussion, there is relatively little discussion of alternative approaches. Given the small sample size and the higher than normal threshold for the determination of statistical significance, the adequacy of this approach for estimating invertebrate dioxin/furan concentrations is questionable. The report shall compare/contrast this approach generally with other relevant dioxin/furan invertebrate uptake estimates in the peer-reviewed and/or CERCLA specific literature.

29. Section 4.3.1.5.2 Estimating $COPC_E$ Concentrations in Soil Invertebrates: The regression and correlation relationships developed from the Cass Lake Superfund site would not be expected to accurately predict soil invertebrate tissue concentrations at the San Jacinto River Site because the range of dioxin and furan concentrations in the six Cass Lake soil samples is much lower, especially for 2,3,7,8-TCDD and 2,3,7,8-TCDF. Additionally, the ratios between congeners in soils from the Cass Lake site are very different from congener ratios at the San Jacinto River Site. For the Cass Lake site, the highest 2,3,7,8-TCDD concentration was 1.83 ng/ kg, and the highest 2,3,7,8-TCDF concentration was 11.3 ng/kg (Table *D-1).* In contrast, at the San Jacinto River Site, the highest soil 2,3,7,8-TCDD concentration was 8,650 ng/kg, and the highest 2,3,7,8-TCDF concentration was 20,600 ng/ kg (Table 6-17 in the Preliminary Site Characterization Report). According to Appendix D, the 2,3,7,8-TCDD congener was not detected in 5/6 of the Cass Lake earthworm samples. In the one sample where 2,3,7,8-TCDD was detected in tissue, it was not detected in soil. Because no statistically significant relationship between soil and earthworm concentrations was identified for some congeners, a correlation approach was used, which compared the ratio of congener concentrations in earthworm tissue. The ratio between concentrations of 2,3,7,8-

TCDF and 1,2,3,6,7,8-HxCDD was used to predict the 2,3.7,8-TCDF concentration in invertebrate tissue. For the Cass Lake site, the average 1,2,3,6,7,8-HxCDD concentration in soil was about 50 times greater than the concentration of 2,3,7,8-TCDF in soil. In contrast at the San Jacinto River Site, the average TCDF concentration in Area 3 soils was over 3,200 times the average 1,2,3,6,7,8-HxCDD concentration in soils (Table 6-17 in PSCR). This suggests that the use of the Cass Lake soil data will greatly underestimate the concentration of TCDF in invertebrate tissue at the San Jacinto River Site. Given the significant difference in soil concentrations for TCDD and TCDF, and the uncertainty associated with the ratio approach, the adequacy of this approach for estimating invertebrate dioxin/furan concentrations is questionable. The report shall compare/contrast this approach generally with other relevant dioxin/furan invertebrate uptake estimates in the peer-reviewed and/or CERCLA specific literature.

30. Section 4.3.1.5.2 Estimating $COPC_E$ Concentrations in Soil Invertebrates: There is a statement in Section 2.1 of Appendix D that "the ranges of dioxin and furan concentrations in soil at the Cass Lake site were similar to the range of concentrations in soils at the San Jacinto River site." This shall be revised. The total TEQ ranges may be similar, but the individual congener ranges were not.

31. Section 4.3.1.6 Wildlife Exposure Units: Figure 4-9 depicts the exposure areas and samples used for the killdeer evaluation. The report shall explain why all of the area on the west side of the upland sand separation area was used for the assessment when surface soil data was not available for the far western third of the property. Additionally, the report shall state whether this inclusion was conservative.

32. Section 4.3.1.6 Wildlife Exposure Units: Figure 4-10 depicts the exposure areas and samples used for the raccoon evaluation. Very limited soil/sediment data was available for these areas and clams and small fish were not collected in this area. The report shall explain why all of the area along the west shoreline of the Southern Impoundment and along the eastern shoreline on the land mass across the Old River Channel (and south of IH-10) was used for the assessment. Additionally, the report shall state whether this inclusion was conservative and how will it be integrated with an ecological assessment for the Southern Impoundment.

33. Section 4.3.1.6 Wildlife Exposure Units: Similarly, Figure 4-11 depicts the exposure areas and samples used for the great blue heron, spotted sandpiper, and marsh rice rat evaluations. Very limited sediment data was available for the areas south of IH-10, and clams and small fish were only collected in an area along the east side of the river channel shoreline (and south of the IH-10 bridge). It is not clear how data from these areas will be incorporated into the exposure calculations. The report shall clarify this. Additionally, the report shall state whether this inclusion was conservative and how will it be integrated with an ecological assessment for the Southern impoundment.

34. Section 4.3.1.7 Ca1culation of Exposure Point Concentrations: Appendix C shall be amended to include the surface water CT and RM exposure point concentrations for TEQs and Total PCBs that were used for determining the bird dose (i.e., surface water ingestion).

35. Section 4.3.1.9 Results: The text states that the results of calculations using BAFs and regression models for invertebrates and plants were not tabulated, but were incorporated directly into the wildlife exposure model. For transparency, this particular part of the dose calculation shall be presented along with the corresponding soil/sediment exposure point concentration.

36. Section 4.3.1.9 Results: Table 4-12 presents the final estimates of the daily ingestion rate of each $COPC_E$ for each receptor. We were not able to duplicate the values indicated for the raccoon. The report shall confirm/clarify the calculations. This may be related to uncertainty associated with the exposure areas assumed for the raccoon (i.e., see comment 9).

37. Section 4.3.2.1.2 Implementation of the Prey-to-Egg Model (Estimated TEQ Concentrations in Bird Eggs): The linear regression models for each congener or homologue group from Elliott ct al. (2001) were used to estimate egg concentrations for the blue heron, cormorant, and sandpiper. The regression equations are shown in Table 4-13. Levels of 2,3,7,8-TCDF were not linearly related for fish and egg concentrations ($p = 0.07$). The report shall discuss the uncertainty associated with the use of the Elliot, et al. (2001) model for this congener.

38. Section 4.3.2.1.2 Implementation of the Prey-to-Egg Model (Estimated TEQ Concentrations in Bird Eggs): The discussion on page 4-29 explains that for the fish-to-egg calculations, an individual sample of each medium was used to represent the CT and RM exposures. The sample selected was that with the $TEQ_{DF,B}$ concentration closest to the calculated CT or RM for the particular exposure unit. The report shall provide more discussion on why this calculation method was selected and the location, sample number, and congener and homologue concentrations of the individual samples selected for use. Additionally, this discussion states that it was considered overly conservative to use the CT and RM for each congener to estimate the concentrations of dioxins and furans in bird eggs. The report shall explain this statement.

39. Section 4.3.2.1.2 Implementation of the Prey-to-Egg Model (Estimated TEQ Concentrations in Bird Eggs): The results of the TEQ calculations using the regression models to estimate concentrations in eggs of the neotropic cormorant, the great blue heron, and the spotted sandpiper are shown in Table 4-15. For transparency, the report shall show the step-by-step calculation of the values in Table 4-15 for the combinations that follow. This would inc1ude presentation of the individual congener concentration EPCs (in food and sediment) as inputs to the calculation.

    a. Cormorant/TCFD/prey only/CT/TEF_{max};

    b. Heron/PeCDD/prey + sediment/RM/TEF_{min};

    c. Sandpiper/∑HxCDF/prey + sediment/CT /$TEF_{min.}$

40. Section 4.3.2.1.2 Implementation of the Prey-to-Egg Model (Estimated TEQ Concentrations in Bird Eggs): It appears that the TEF /TEQ values are missing for the heron and sandpiper

(Table 4-15, background: prey + sediment). The report shall provide these values or explain why they were not presented.

41. Section 4.3.2.2.1 Overview of Literature Found (Estimating PCB Concentrations in Bird Eggs): The complete reference for Naito and Murata (2007) was not provided in the list of references. The report shall add this to the list of references. Additionally, the actual BMFs (biomagnification factors) in this paper were cited from other papers.

42. Section 4.3.2.2.1 Overview of Literature Found (Estimating PCB Concentrations in Bird Eggs): The results of the TEQ calculations using the indicated BMFs (Table 4-16) to estimate PCB concentrations in eggs of the neotropic cormorant, the great blue heron, and the spotted sandpiper are shown in Table 4-17. For transparency, the report shall show the step-by-step calculation of the values in Table 4-17 for the combinations that follow. This would inc1ude presentation of the individual PCB congener concentration EPCs (in food and sediment) as inputs to the calculation.

    a. Cormorant/PCB lO5/prey + sediment/CT;

    b. Cormorant/PCB126/background: prey + sediment/RM;

    c. Heron/PCB 077/background: prey/RM;

    d. Sandpiper/PCB 118/prey only/CT.

43. Section 4.3.2.3 Egg Exposure Scenarios: Previous sections detail the approach for estimating egg TEQ_{DF} and TEQ_{P} concentrations using regression equations or BMFs applied to empirical fish tissue concentrations. This information is needed to evaluate potential risks to birds by comparing estimated TEQ concentrations in eggs to TRVs expressed as egg concentrations (wet weight). Exposure scenarios detailed here reflect an evaluation of egg concentrations resulting from combinations of prey (fish, crabs, or common rangia) and sediment. The report shall provide clarification regarding how egg tissue concentrations were estimated based on uptake from sediment, crabs, and common rangia. This is not clear.

44. Section 4.4.2 Derivation of Parameter Distributions: Table 4-19 displays the distribution characteristics for the various exposure parameters used in probabilistic risk analysis. The report shall discuss why any particular reference (e.g., DREBWQAT (1999) and Fernandes (2011)) was used here, and not in the initial dose calculations. Also, the report shall explain a triangular distribution.

45. Section 5.3 Benthic Macro-invertebrate Communities: Notes f, h, and i are missing from Table 5-1. This table shall be revised to include these.

46. Section 5.3 Benthic Macro-invertebrate Communities: The marine chronic criterion for lead (Texas Surface Water Quality Standards (TSWQS), §307.6 (c)) of 5.3 ug/L shall be used for evaluating estimated pore water concentrations as this value is more conservative that the federal criterion. This is an ARAR (Applicable or Relevant and Appropriate Requirement).

47. Section 5.3 Benthic Macro-invertebrate Communities: For the evaluation of reproductive risks for molluscs, the BERA used the paired NOAEC/ LOAEC (no-observed adverse effect concentration/lowest-observed adverse effect concentration) values of 2 and 10 ng TCDD/kg ww tissue, respectively, for delayed gonadogenesis in males (Wintermyer and Cooper (2007). An NOAEC of 2 ng TCDD/kg ww tissue is too high given that this concentration has been found to adversely affect early stages of oyster gametogenesis (Wintermyer and Cooper (2007) and veliger larval survival (Cooper and Wintermyer (2009). The report shall be revised to include the 2 ng TCDD/kg ww tissue concentration as the LOAEC, and a lower NOAEC shall be determined based on an appropriate literature value.

48. Section 5.3 Benthic Macro-invertebrate Communities: Continuing with a discussion of the NOAEC/LOAEC values for molluscs, the referenced studies only dosed the molluscs with 2,3,7,8-TCDD, whereas the molluscs at the site are potentially exposed to all of the dioxin and furan congeners. Thus, site molluscs would have a greater exposure to total dioxins/furans overall. This compounds the uncertainty associated with the selected tissue residue endpoint for molluscs. The report shall evaluate/clarify this.

49. Section 5.4 Fish: For nickel, the results of tests with marine fish were combined to determine a chronic TRV for nickel expressed as a concentration in water (3,600 ug/L; Table 5-2 and Table B-16). The marine chronic criterion for nickel (TSWQS, §307.6 (c)) of 13.1 ug/L shall be used. This is an ARAR.

50. Section 5.4 Fish: The TRVs (NOAEL and LOAEL fish whole body concentrations) for Total PCBs are summarized in Tables 5-2 and B-11 and are discussed in Sections 2 .2 .1.1 and 2.2.1.2 of Appendix B. These TRVs are largely based on studies where fish were exposed to Aroclor 1254 and tissue was analyzed for Total PCBs. The report shall briefly discuss the uncertainty associated with the use of Aroclor toxicity data relative to the congener tissue data used for the BERA.

51. Section 5.4 Fish: Regarding the TCDD TRV (from Steevens et. al. (2005)), our understanding is that the tissue residue TRV is based on concentrations in fish eggs and embryos rather than whole fish. The report shall clarify this. It appears that whole fish concentrations are used in the hazard quotient calculations (Section 6.3.4).

52. Section 5.6 Birds and Mammals: The avian and mammalian TRVs for Total PCBs are summarized in Tables 5-3, 5-4, and B-11, and are discussed in Sections 2.2.3 and 2.2.4 of Appendix B. These TRVs are largely based on studies where birds or mammals were exposed to Aroclor 1254 in their diets. The report shall briefly discuss the uncertainty associated with the use of Aroclor 1254 (primarily) toxicity data relative to the total PCB (sum of Aroclors) tissue and sediment data used for the BERA.

53. Section 5.6 Birds and Mammals: The report shall re-evaluate the calculated NOAEL and LOAEL values for the avian TRVs for barium. We were not able to duplicate the values indicated in Table 5-3 based on the text in Section 3.2.2 of Appendix B. The report shall also evaluate the indicated TRVs. Presumably this would be relevant for the SLERA for the area

south of IH-10 because barium is not a $COPC_E$ for wildlife receptors for the area north of IH-10.

54. Section 6.2 Risks to Benthic Macro-invertebrate Communities: This discussion generally compares the various screening values with the bulk sediment or estimated pore water concentrations, indicates the number of exceedances, and plots the sample locations on a series of figures. This discussion shall be revised to indicate the concentrations (i.e., bulk sediment or estimated pore water) that exceeded the screening values.

55. Section 6.2.3 TCDD in Clam Tissue Relative to the Critical Tissue Residue for Molluscs: Potential risks associated with critical tissue residue in molluscs shall be reevaluated given the concerns regarding the selected tissue NOAEC/LOAEC values.

56. Section 6.2.3 TCDD in Clam Tissue Relative to the Critical Tissue Residue for Molluscs: Absent confirmation sampling, it is unknown whether risks to molluscs in the vicinity of Transect 3 have been greatly reduced as a result of the TCRA. The report shall clarify this.

57. Section 6.2.3/8.1: The conclusion that risks to bivalves are low in transects 3 and 5 based on the available data on clam tissue is not appropriate. If the assertion is that the TCRA has addressed the affected bivalves near the pits, monitoring post-TCRA will be necessary along with appropriate action levels in clam tissue.

58. Section 6.2.5 Summary: Lines of Evidence for Benthic Macro-invertebrate Communities: The actual risk to populations of molluscs (based on tissue concentrations of dioxins/furans) is unknown. Additionally, consideration of potential risks to molluscs directly adjacent to the impoundment or elsewhere on the Site will be driven by the selected tissue NOAEC/LOAEC (see comments for Section 5.3). The report shall clarify this.

59. Section 6.3.1 Estimated Concentrations of Metals in Fish Diets Relative to TRVs: Hazard quotients for fish exposed to cadmium, copper, mercury, and zinc in foods and sediment are summarized in Table 6-3 and indicate that the LOAELs are not exceeded. These hazard quotients will be revisited based on the report revision in response to comment 8.

60. Section 6.3.2 Estimated Concentrations in Surface Water Relative to TRVs: A hazard quotient of less than 0.1 was determined for fish exposed to nickel in surface water (Table 6-4). The hazard quotient will be above one using the chronic Texas criterion (see previous comment 39). The report shall be revised to include the chronic Texas criterion.

61. Section 6.3.3 Total PCB Concentrations in Whole Fish Relative to the TRV for Fish: See previous comment 40 regarding the toxicity studies used to derive the fish whole body TRVs.

62. Section 6.3.5 Summary - Lines of Evidence for Fish: This discussion concludes that overall, risks to fish on the Site are negligible. This conclusion will be revisited based on the report revision in response to previous comments regarding the exposure concentrations (surface water), diet, and TRVs for fish.

63. Section 7.4.2.5 Datasets Used to Evaluate Exposure to Fish: The references for the killifish movement/home range were not provided in the reference section. The report shall provide the full references.

64. Section 8.2 Characterization of Risks to Fish: The discussion summarizes that baseline risks to the assessment endpoints (stable or increasing populations of benthic omnivorous fish, benthic invertivorous fish, and benthic piscivorous fish on the Site) arc negligible. This conclusion will be revisited upon the report revision in response to previous comments regarding the exposure concentrations (surface water), diet, and TRVs for fish.

65. Section 8.4.2.6 Results of Fish Exposure Assessment: The values in Table 4-6 shall be related with the exposure point concentrations in Appendix C, if applicable. If not applicable, the report shall explain how these weighted concentrations were derived and indicate where the data is summarized so this can be verified. Finally, the report shall clarify why is the total diet (last column in Table 4-6) simply the sum of each of the CT and RME values. Have the individual values for each food type already been modified by the proportion each food type represents in the diet?

66. Section 8.6 Ecological Risk Assessment Conclusions: The overall risk assessment conclusions will be revisited after receipt of a revised BERA and accompanying responses to agency comments.

67. Section 9.4.3 Exposure of Reptiles, Mammals, and Birds: Table 4-7 presents the exposure areas and assumptions for food/sediment/soil for various receptors. The exposure assumptions for the raccoon were a bit confusing. Presumably, concentrations in molluscs for the peninsula shoreline were used. It was not clear why this was not the case for small fish also since exposure point concentrations were presented for this subset in Appendix C. For terrestrial invertebrates and plants, it was unclear why concentrations were modeled from soil concentrations for soils north of IH-10 if soil ingestion was modeled for the entire peninsula. The report shall clarify/explain these issues.

68. Table 4-5: Were there not 10 samples collected and analyzed from each FCA? The report shall clarify this.

69. Table 5-1: The report shall provide additional information supporting the assumption of dividing the LC_{50} by 10 results in a defensible estimation of the NOAEC. In this table an uncertainty factor of 10 is applied to a LC_{50} resulting in a NOAEC and an EC_{50} yielding both a NOAEC and LOAEC. There is a disconnect in the logic in using this factor.

70. Table 5-1: This table has an incorrect reference for the TCDD value. The comment indicates that the range was derived from table B-5, but it should be Table B-4. The report shall be revised to correct this.

71. Table 5-2/B-14: The TCDD value is described as a NOAEC; however, the source of this value indicates that it was the geometric mean of the NOER and LOER. The report shall either provide justification for the designation as a NOAEC or rename.

72. Table 5-2/B-14/B-11: The source of the NOAEC and LOAEC for PCBs in fish is not clear. Although a summary of the studies used to derive these values is included in Section 2.2.1.1, 2.2.1.2, and Appendix B, it was not clear which of the studies were selected and which were not to calculate the NOAEC and LOAEC in this BERA. The report shall provide a table similar to B-4 for fish, and include only those studies used to calculate the TRVs.

73. Figure 2-2: This figure combines the worker and trespasser receptor categories. Additional clarification/justification shall be provided for why these categories should be combined.

Appendix E: Draft Screening-Level Ecological Risk Assessment, South Impoundment

74. Section 2.5 Assessment Endpoints: In Table E-3 (assessment endpoints), the assessment endpoint for mammals does not pair up with the selected receptor (pocket gopher) because it is an herbivorous mammal. The report shall include an omnivorous mammal (e.g., shrew, marsh rice rat, or armadillo) and revision of Table E-3.

75. Section 3.2 Ecological Risk-Based Screening Methods: For the semi-volatile organic chemicals (SVOCs), footnotes shall be added to Table E-5 to indicate where the median value for the Site-specific background concentrations was used. Additionally the explanation for note c is unclear (also in Table E-6). The report shall clarify this.